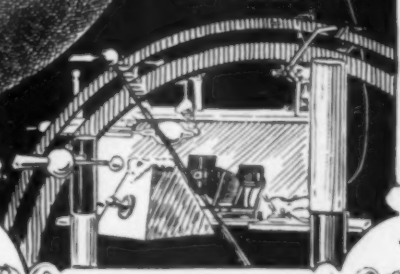
VOL. 3. No. 6. DECEMBER, 1898.

# THE AMERICAN X-RAY JOURNAL

A MONTHLY DEVOTED TO THE PRACTICAL APPLICATION OF THE NEW SCIENCE AND TO THE PHYSICAL IMPROVEMENT OF MAN.



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# THE AMERICAN
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Devoted to Practical X-Ray Work and Allied Arts and Sciences.

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## FLUOROSCOPES versus UNCOVERED SCREENS.

Soon after Roentgen's publication of his discovery of x-rays, Salvioni, abandoning the method of covering the tube with black cloth, invented the cryptoscope with which an uncovered tube could be used, the light being prevented from reaching the eyes by means of a box enclosing the luminescent screen. Edison by substituting tungstate of calcium and modifying the cryptoscope gave us his fluoroscope which in America has become a standard instrument.

In making medical examinations the use of a fluoroscope is fatiguing to the eyes, because they are exposed to a confined and warm atmosphere and are required constantly to adjust themselves to variations in the light caused by removing the fluoroscope at intervals and subjecting them to illumination of the room. In making graphic records of the movements of the diaphragm and heart, as should be done in all examinations of the chest, the use of a fluoroscope is exceedingly inconvenient. It is therefore best to go back to a modification of Roentgen's method of enclosing the tube in a black cloth. Without modification this method is objectionable because the cloth (in damp weather) carries part of the current around the tube, thus wasting it. I prefer to place the tube in a box, as has already been done by several operators, though I find it objectionable to enclose the entire tube, on account of leakage, as with the cloth. The form I recommend is shown in Figure 43. The supports for the end of the tube are of hard rubber. The connections with the terminals of the generator are held in hard rubber plugs easily removed when it is desirable to disconnect them. This tube holder is to be used in the diaphragm holder shown on page 400 of this JOURNAL for September, 1898, Figure 34.

All powerfully excited tubes give off in addition to the short vibrations producing Roentgen light longer vibrations

causing ordinary light. Enough of this latter escapes through the uncovered ends of the tube, which project beyond the box, to faintly illuminate the room so that the physician can see to move about and yet the light is too feeble to interfere with the use of the uncovered luminescent screen, which should be of the nonphosphorescent type discovered by Mr. Kinraide, in size not less than 11 by 14 inches, and placed in a light wooden clamping frame serving also to hold the tracing cloth in firm position. The frame is then secured in contact with the patient and on the tracing cloth are marked certain fixed parts of the body for reference, after which the movements of the diaphragm and heart or dull areas in the lungs are sketched in. This method of examination originated and developed by Dr. Francis H. Williams has been found to be very simple and convenient. The charts properly labeled and card catalogued are filed away, becoming invaluable and easily accessible records for subsequent study and comparison. As the use of Roentgen light enables us to detect diseases of the lungs before they can be found in any other way, the time is not far distant when consumption will be a much less serious disease than it has been, because, when detected early the patients have been found to rapidly respond to treatment. What have been supposed to be the very earliest stages are now proved by Dr. Williams to have been well advanced. In this connection I have already written on the importance of regular examinations by Roentgen light and have advocated them from the beginning to my patients. When there is an inherited tendency to weakness of the heart or lungs the importance of these semi-annual examinations cannot be overestimated.

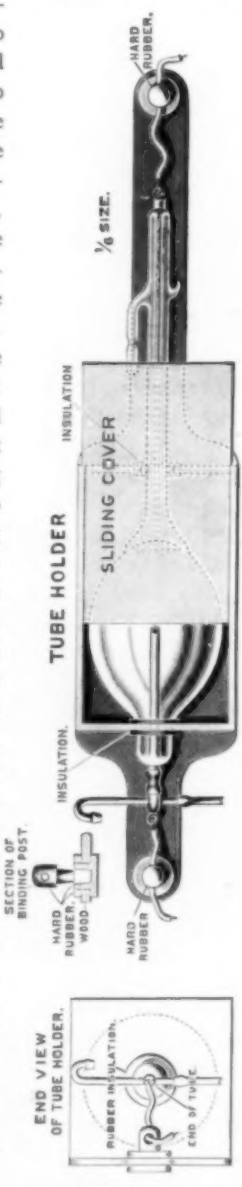


FIG. 43.

WILLIAM ROLLINS.

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PROF. ROENTGEN TO GO TO LEIPSIC.—The *New Yorker Staats-Zeitung*, in a dispatch from Berlin announces that Professor W. C. Roentgen, the discoverer of the rays bearing his name, has been tendered the chair of philosophy in the University of Leipsic, with exceedingly flattering inducements. It is also stated that the Professor will accept the call. In connection with this report, it may be of interest to state, that not long ago, in recognition of his valuable labors, Prince Ludwig, of Bavaria, created Prof. Roentgen a Baron. Kaiser Wilhelm has decorated the great scientist with the Order of the Royal Crown.—*Electrical Engineer.*

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X-RAY APPARATUS FOR MILITARY POSTS.—According to the *Press and Circular*, November 9, the British War Office, recognizing the advantages of the x-ray in military surgery, has issued a large number of outfits to the home and foreign stations under its charge.—*The Journal of the American Medical Association.*

## SKIAGRAPHY AND THE CIRCULATION.

WILLIAM SMITH,

Licentiate of the Royal Colleges of Physicians and Surgeons, Edinburgh, and of the Faculty of Physicians and Surgeons, Glasgow. Licentiate in Midwifery. Member of the Medico-Chirurgical Society and Fellow of the Obstetrical Society, Edinburgh. Demonstrator of Anatomy in the American School of Osteopathy, Kirksville, Mo.

It is probable that every teacher of anatomy has, at some period or other, felt in his inmost being a desire to see how the structures of the body appeared before being subjected to the mutilation of the knife and the necessary alteration of relations. This desire was satisfied in a great measure so far as the skeletal apparatus was concerned by the advent of the Roentgen rays; but the extreme permeability of the soft parts of the body rendered further observation of little value. In the case of the vascular apparatus an easy method appeared to be the injection of the arteries with some substance impervious to the rays, and, of course, the first agent thought of was mercury. Unfortunately the metal is very heavy and also has a tendency on injection to be erratic in its distribution; as a consequence the mere weight of the injected material breaks down the smaller vessels, or, in other cases we find serious hiatuses in the resultant radiograph.

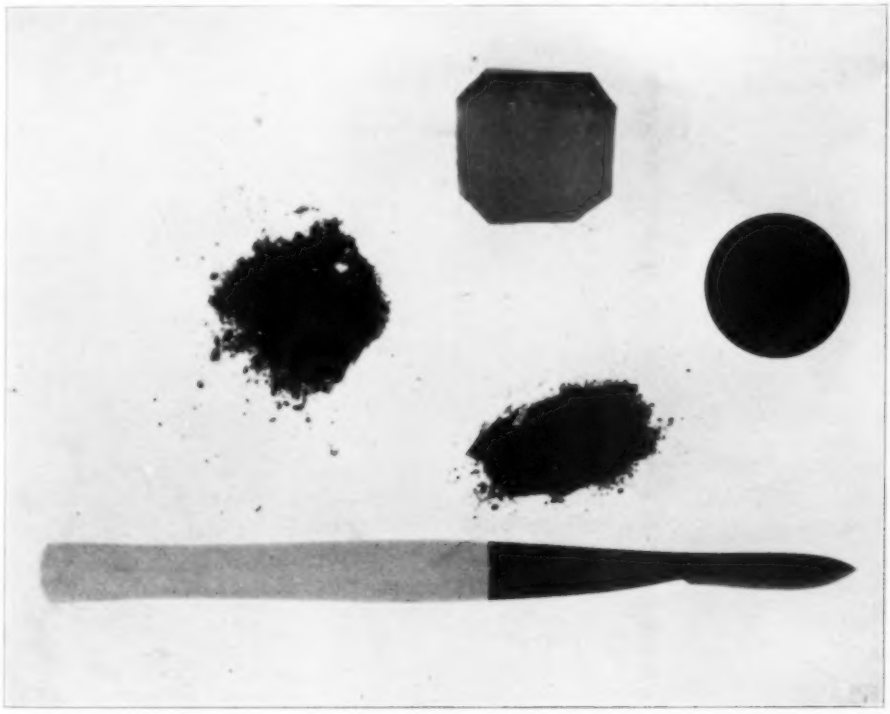

FIG. 1.

The school with which I am connected as Demonstrator of Anatomy recently secured a ten-plate Van Houten and Ten Broeck static machine, together with a Dennis fluorometer and a series of large-sized Crookes' tubes, Monell type, and the idea entered my head to try and ascertain whether it was not possible to devise some system of arterial injection which should comply with the following requirements: First, be of such consist-

ence as to be readily injected into the smallest vessels without solution of continuity; second, be almost, if not quite, as impervious to the rays as is bone; third, to be of such consistence, either on injection or immediately thereafter, as not to tend to gravitate to the more dependent parts of the body and so leave the higher vessels devoid of injection; fourth, be of such weight as not to rupture the smaller vessels. On these lines I made some experiments, and now present to THE AMERICAN X-RAY JOURNAL some account of my method and its results, prefacing what there is to be said by the remark that my work in this line is only in its infancy.

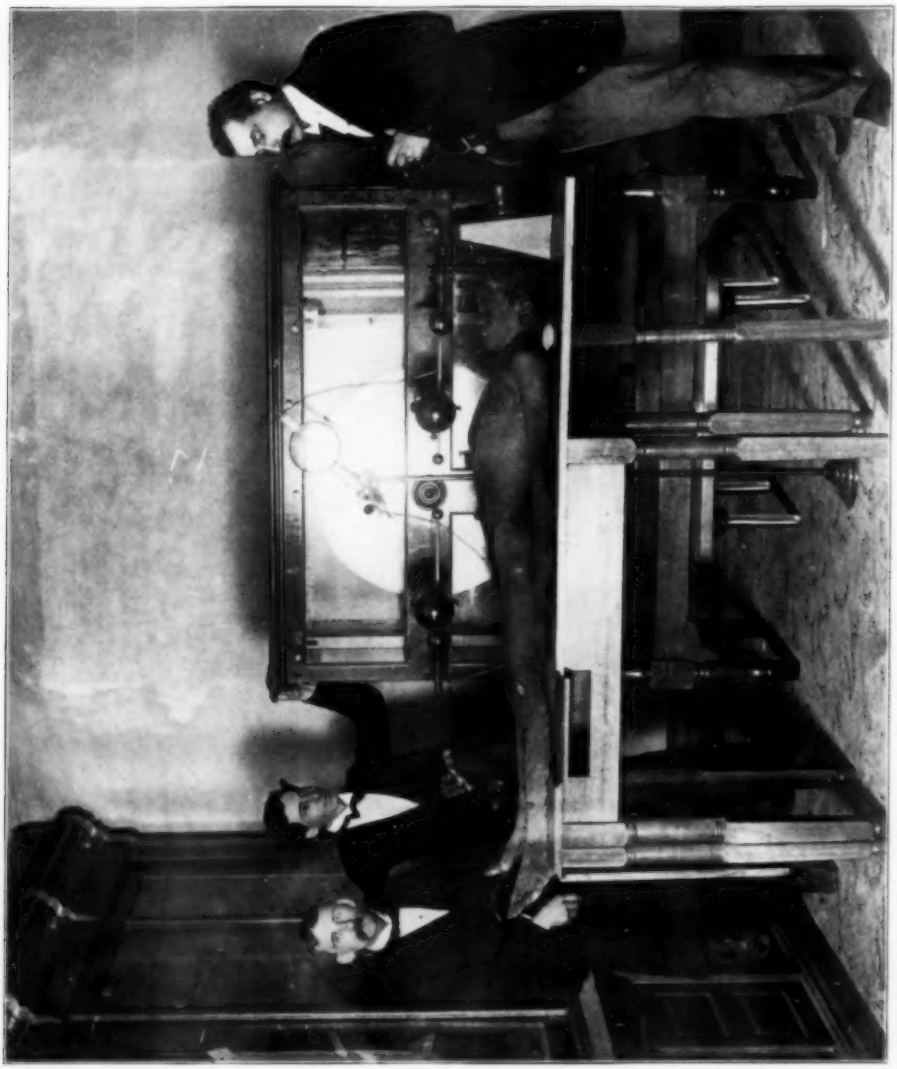

FIG. 2.

The first problem to be considered was as to what material would most efficiently interrupt the rays, and at the

same time be readily introduced into the arteries. Metallic mercury for the reasons previously given I did not consider; solutions of salts I believed would be impractical as, in order to produce opacity, it would be necessary to wait for either precipitation or drying, and in either case the tendency to settlement in the more dependent parts was certain. I was therefore compelled to discover some agent which might be mixed with

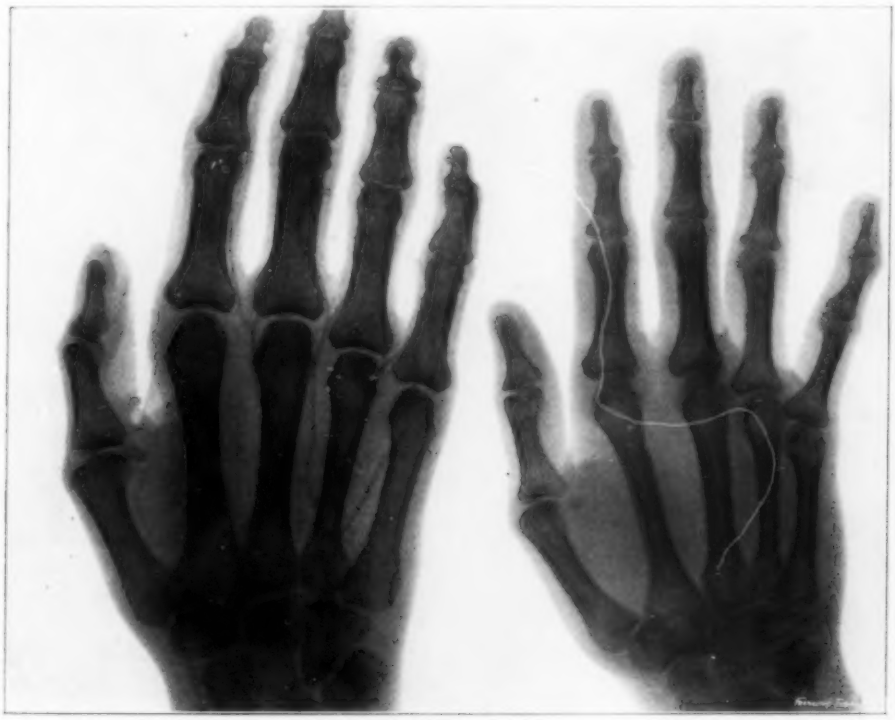

FIG. 3.

substances which would carry it into the body, hold it in suspension and then harden with it in position. I tested a few salts with the fluoroscope and found that vermillion (the bi-sulphuret of mercury, or red sulphide) was very opaque to the rays; the Chinese being rather more so than that produced in this country. In Fig. 1 I show the two specimens, (Chinese and the domestic article) as compared with such objects as a silver quarter-dollar and an ebony-handled dissecting scalpel. The little mass above the scalpel in the picture is the Chinese product. (And let it be noted that the vermillion is almost as opaque as metallic silver).

Having found my agent to be introduced, the matter of its method of introduction now arose; its settlement was easy. In my work as demonstrator I inject in all my subjects an arterial filling of tallow and spermaceti with coloring matter. It is more troublesome to produce than a plaster injection, but the result amply justifies the extra trouble. I made up a compound of tallow and yellow beeswax, selecting the latter instead of spermaceti as it hardens rather slower and also produces a mixture which is not quite as brittle as that made with spermaceti; the proportions being made simply by a process of "guess," adding more and

more beeswax until the consistency of the mixture when cold satisfied me. In the same manner I added my vermillion, taking a drop of the compound and examining it on the fluoroscope until the opacity of the mixture led me to believe that a body injected with it would have its arteries sufficiently clearly defined by the rays to be capable of skiagraphic delineation. In Fig. 1 a small, regularly shaped object is seen at the top of the cut; that is a drop of the injected wax allowed to fall on a smooth surface, which after cooling was cut into that shape. The thickness is precisely that of the silver quarter, as also is that of the two masses of vermillion. It can thus be readily seen that the opacity of the material is marked, but that the particles of vermillion have been so far separated by the menstruum that the rays could readily pass between them and thus render the opacity very materially less than in the pure powder.

FIG. 4.

Having settled the preliminary points, all that remained was to inject some bodies with the mixture and then determine whether or not it was a success; first by fluoroscopic observation; second, by skiagraphy. The technique of the injection process is not difficult but disagreeable. I selected four bodies for the pur-

pose, and from three of them illustrations accompany this article. Each body was first immersed completely in a bath of water heated to a temperature of 45 C. and the water was then kept at that temperature for two hours. During the latter part of this time the mixture for injection was heated to a point somewhat under the boiling point of water. Immediately upon the removal of the body the injection was made, the vessel selected for the purpose being the femoral for the reason that I judged, it being in a fairly central part of the body, the distribution of the liquid would be more rapid throughout the arterial system. As an artificially heated body cools very rapidly (extremely rapidly as compared with postmortem cooling) this is an important point in any injection with material which is used hot, so also, to save time, it is well to expose the artery before immersing the body. The injection was made with a metal syringe holding about thirty ounces, through specially made nozzles provided with stop cocks. The arteries were injected as fully as possible, save in one case shown where the injection was cut off from certain parts in order to exhibit the difference in appearance. The body was not moved after the injection

FIG. 5.

was made until it was quite cold; and then extreme care was taken to avoid flexion of any part which would, naturally, have broken the continuity of the hardened mass of coloring matter.

The accompanying illustrations were all made from three bodies, as already stated; the first was the body of a male aged 35, slight build (No. 1); the second was a colored female, 22 years of age, medium build (No. 2); the third, an aged

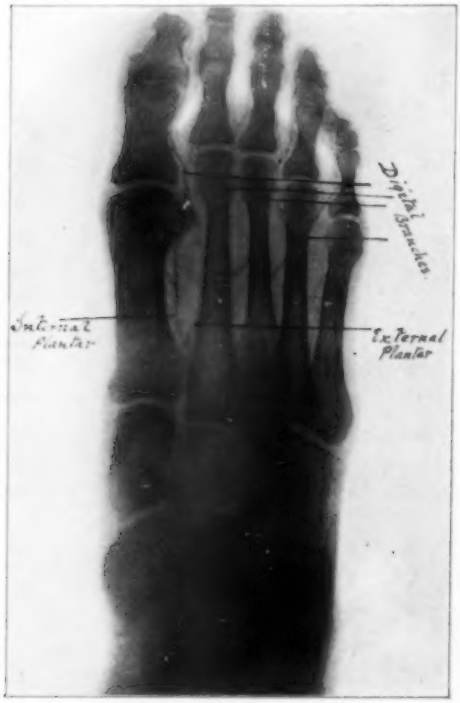


FIG. 6.

negro, spare but muscular (No. 3). In Fig. 2 No. 2 is shown on the fluorometer table. The position is that as the radiograph of the thorax was being taken. It will be noticed that the body is that of a fairly well-built woman, with a thorax by no means flattened.

The statement has been made that dead tissue is very much more impervious to the rays than living. Accordingly I made the exposure longer. But in Fig. 3 is seen a controversion of the statement. The two hands there shown are the right hand of No. 1, and the corresponding hand of a young woman who kindly placed her hand on the plate and allowed me to use it in comparison. Both hands were about the same thickness; the tube was so placed as to shed its radiance on a point precisely between the two; the exposure was three minutes. In the photograph both are *exactly* the same in clearness of definition. This fact was not, however, ascertained until I had made all of the other radiographs; hence the far longer exposure which is recorded in connection with each.

Fig. 4, hand of No. 1, shows very clearly the radial and ulnar arteries, as also the anterior and posterior interosseous, also the anterior carpal branches of the radial and ulnar, and the various digital branches. Length of exposure, 10 minutes.

Fig. 5 is placed next in order to show in contrast to the last an abnormal condition of the arteries. This is the hand of No. 3, and here we see a magnificent illustration of the tortuosity of the vessels in the aged, consequent upon the hardening of the vessels and their loss of elasticity leading to increase in their length. Note here that even in the small digital branches this is well demonstrated. Exposure, 10 minutes.

Fig. 6 is taken from No. 1, and here are seen the internal and external plantar arteries, with the plantar arch and digital branches. The exposure here was 12 minutes, but owing to the density of the tissues of the foot and the greater size of the bones the arteries are not seen as clearly as are those in the hand.

Two feet are seen in Fig. 7, these are from No. 2; in this case one foot and one hand were shut off from the injection by strong pressure on the arterial trunks. One foot is thus seen uninject-

ed while the other shows plainly the track of the vessels. In Fig. 8 the hand in this case is shown, the radial and ulnar arteries are seen distended and distinct, their branches are invisible.

Fig. 9 is the elbow of the same case, here are seen the following vessels, the brachial bifurcating into the radial and ulnar; branches of the superior and inferior profunda and the anastomosing branches from the radial and ulnar. Note in this case the clearness of definition of the very small branches from the two profunda arteries.

In Fig. 10 is seen another pathological condition; No. 3 had at some time sustained an amputation through the junction of the middle and the lower third of the thigh. The femoral artery has here undergone consequent atrophy, (to a very great extent at least,) and in its lower part exists only as a very slender and rapidly diminishing trunk. In this case note that the injection has been broken subsequent to its introduction; also that, while the amputation had evidently been done long before, the bone is not rounded off. Exposure, 10 minutes.

FIG. 7.

Next follow three radiographs which I consider of special interest, none so ex-

tensive of injected subjects, so far as I am aware, having ever been attempted, and I am not a little pleased with my success on this first trial. Fig. 11 shows the thorax of No. 1. Here are well seen the base of the heart with the arch of the aorta and its branches. The axillary artery lying in close relation with the neck of the scapula, giving off the circumflex (which one, whether anterior or posterior, I am unable to say) and the subscapular. In the case of the latter it is interesting to note the curious twist; the artery requires the means for increasing and diminishing its length to accommodate to the movements of the shoulder. Nature has made provision. Compare this artery with the same in Fig. 12. Here also we see well the carotids in the neck, together with the vertebrals. In these last three illustrations special care was taken to have the Crookes' tube *exactly* over the center of the object to be depicted, and the anode level with the horizon. Hence we have, in each case, an almost absolutely symmetrical picture. Exposure, 60 min. Another thorax is shown in Fig. 12, that of No. 2; the same remarks as in the last case would apply in this, save that on one side it appears as though the axillary artery were double; this, however, may be only apparent, as in more than one case of employing hot injections I have found that the injected material has passed through the capillaries in a part and thus filled the veins. Here it seems too thorough, and in cases where colored wax passes through the capillaries it is always found of a distinctly lighter hue in the veins, much of the coloring matter having been filtered out

FIG. 8.

FIG. 10.

in the capillaries. Here both vessels appear equally opaque, I am thus inclined to believe that we have a double axillary artery. Time of exposure, 70 minutes.

The position of the tube in the cases of the two thoraces was precisely similar. It may be noted that the structures in the neck of No. 1 are much more distinct than in No. 2; the difference is due to the fact that in the female subject there existed a large goiter which, being so highly vascular, was distended with the injection and so tended in a marked degree to obscure the sublying vessels and bones.

Fig. 13 is a view of the pelvis of No. 2. This was somewhat disappointing to me as the pelvic vessels are not clearly defined. When one considers, however, the vascularity of the parts, and that all the vessels are filled with material somewhat opaque, it is not at all wonderful that even an exposure of 70 minutes should not show more clearly such large structures as the aorta and the iliac arteries. They all lie deeply, are covered by vascular structures, and these simply render the picture very cloudy. The superficial and deep femoral arteries are well seen, the internal and external circumflex branches of the

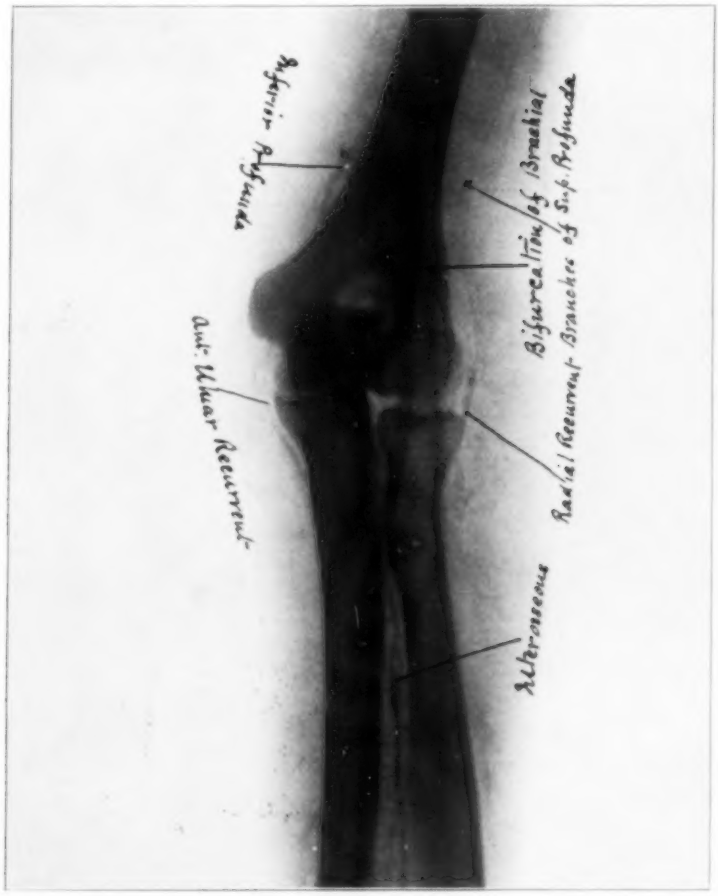


FIG. 9.

latter; the obturator lying in relation with the thyroid foramen and, very faintly, the sciatic and comes nervi ischiadici. The girl from whom this illustration was taken had the narrowest pelvis which I have yet noted; the distance between the anterior superior spines was only 17.5 cm, while she was a little above medium height and of normal build in every other particular.

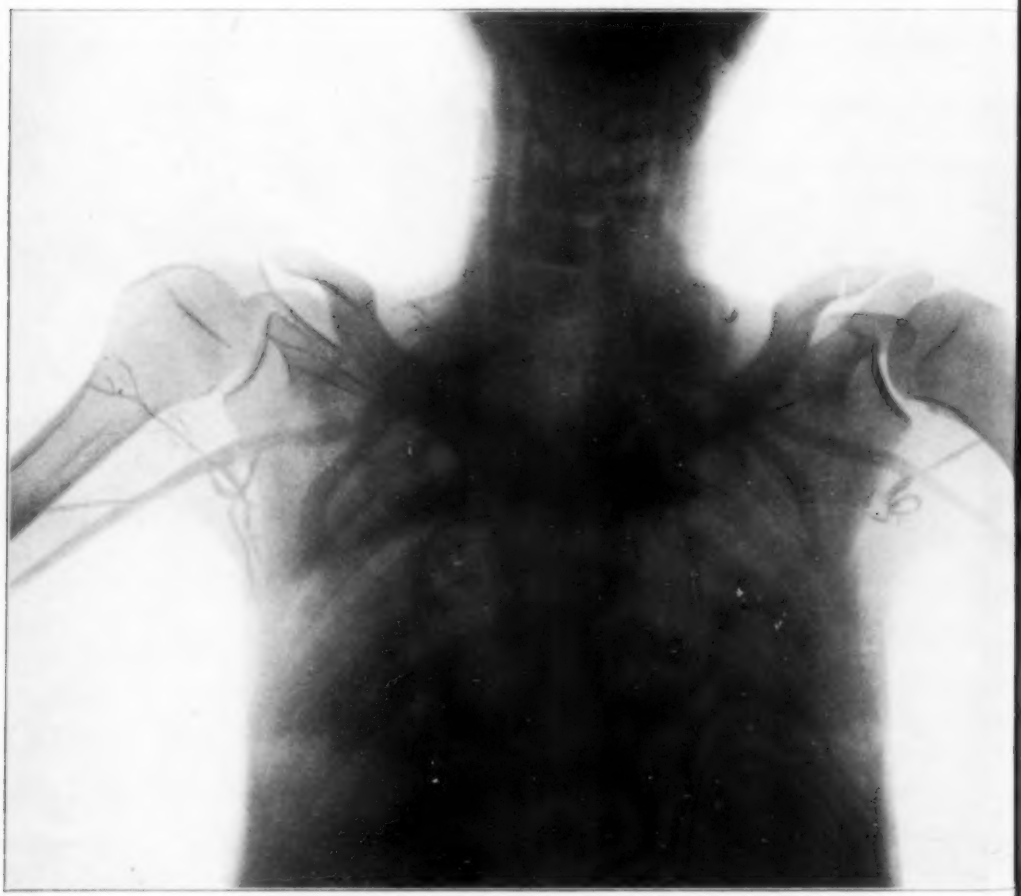

FIG. 11.

As regards the height at which the tube was elevated above the plate; this varied from 30 cm. in the case of the hands, to 70 cm. in the case of the thorax and pelvis. The height in the latter cases was estimated with regard to the area to be covered.

While writing this paper I have before me reproductions of the photographs from which are made the illustrations which accompany it. These are larger and of course clearer than any half-tone can be; it may be, therefore, that my remarks do not apply with exactitude to the figures in the JOURNAL.

To Dr. David Littlejohn, who has charge of the X-ray Department in the school with which I am connected, and in which these experiments were carried out, I have to express my thanks for

much valuable assistance; while Mr. Lee Hickman, a student, also merits acknowledgment for his very careful handling of the plates in development.

## The Magnetic Deflection of Diffusely Reflected Cathode Rays.

BY ERNEST MERRITT.

It is now known that x-rays are developed in a Crookes' tube at all places where the cathode rays encounter a solid obstacle. In the tubes now made the cathode rays are usually "focussed" on a piece of sheet platinum, and the x-rays proceed from this focus. But other rays are developed at this point as well as Roentgen rays, and are the cause of the brilliant fluorescence which usually covers about half the glass of such tubes. The rays are deflected by a magnet like cathode rays. In this they differ from x-rays, which are entirely unaffected by the most powerful magnetic field. Goldstein, who first observed these rays, believed them to be cathode rays that had been diffusely reflected from the platinum, just as light would be scattered by a roughened surface. S. P. Thompson believed that the rays were intermediate between cathode rays and x-rays, and

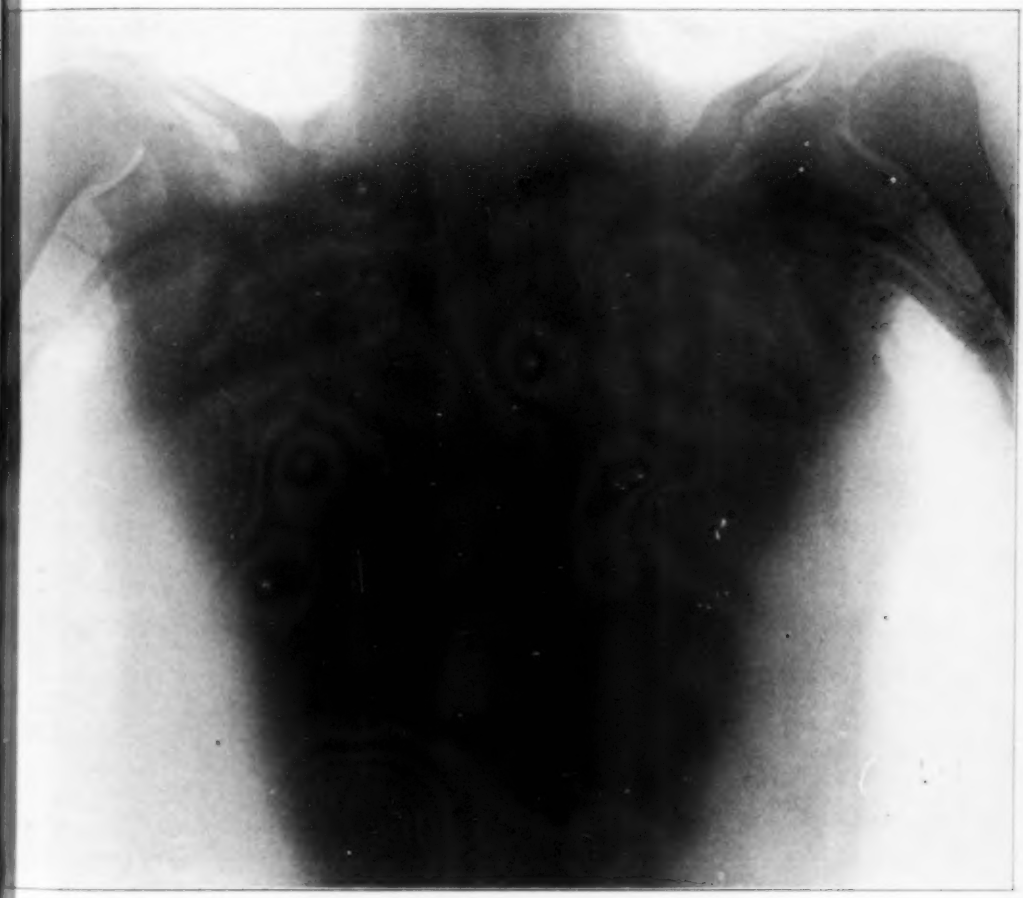

FIG. 12.

has proposed for them the name "para-cathodic rays."

The author has measured the deflection of the "para-cathodic rays" in a given magnetic field, and compared it with the magnetic deflection of the direct cathode rays in the same tube. No difference could be detected in the behavior of the two sets of rays. This fact must be looked upon as an argument in favor of Goldstein's view. According to the generally accepted theory, cathode rays consist of small negatively charged particles repelled at enormous speed from the cathode. It seems probable that when these particles strike an obstacle some are stopped, and by their impact produce the x-rays; a few of the particles may, however, rebound like elastic balls. The particles that rebound will then travel off with practically undiminished velocity and will form the "para-cathodic rays," possessing all the properties of the original cathode rays.

FIG. 13.

The author is therefore of the opinion that "para-cathodic rays" are really the same as cathode rays, and result from diffuse reflection.—*Electrical Engineer.*

# LONDON ITEMS.

J. M. BARBOUR, M. B.,
Librarian Roentgen Society, London, Correspondent.

### The Roentgen Rays in Italy.*

According to a review by Dr. Emile Boix in the current number of Duplay's *Archives*, one of the latest additions to the series of manuals which, to the number of over 600, have been issued by the well-known Milanese publisher Ulrico Hoepli with a view to the popularizing of science, art, and literature, consists of a volume by Italo Tonta on the nature, history, and practical application of the Roentgen rays. The author, who has studied his subject in several German schools, adds the experience of others to his own observations and advances certain hypotheses which he has formed regarding the nature of the rays and the effects which they produce. He also discusses their mode of action, chemical and luminous, and is able to find a great many points of analogy between them and lightning. Adopting Crookes' theory that all transmissible physical forces are due to vibrations through ether and matter differing from each other solely by reason of the relative rapidity of the vibrations, he likewise agrees with Roentgen, that whereas electricity corresponds to 33,359,730,750 oscillations per second the x-rays should be included in the category which corresponds to about 300,000,000,000 oscillations per second. But Signor Italo Tonta does not adhere exclusively to the dry bones of science, being evidently of opinion with Horace that *omne tulit punctum qui miscuit utile dulci*, for he quotes the following definition of electricity which was written by Galileo Ferrari in an album at the request of a young lady with scientific aspirations: "Ever since Maxwell showed that luminous vibrations may consist in periodic variations of the electro-magnetic forces and his theory was given an experimental basis by Hertz, who adduced facts to prove that electro-magnetic oscillations propagate themselves as light does, the idea has gone on growing ever firmer that the luminous ether and the medium where electro-magnetic forces have their seat are one and the same thing. Wherefore, O! maiden, so intelligent and so amiable, who dost ask What is electricity? am I able to reply to thine inquiry. Electricity is not only the titanic agent which tearing athwart the atmosphere terrifies by the crash of its thunderbolt, but also the vivifying agent which transmits from the sun to the earth by means of light and heat the magic color and the breath of life, which communicates to thy heart the pulsing of the external world and conveys to thy soul the enchantment of a look and of a smile."—*Lancet.*, 2, 22, 10, 1898.

*Italo Tonta: Raggi di Roentgen e loro pratiche applicazioni, 160 pp., 65 figs., and 14 plates. Milan: Hoepli, 1898.

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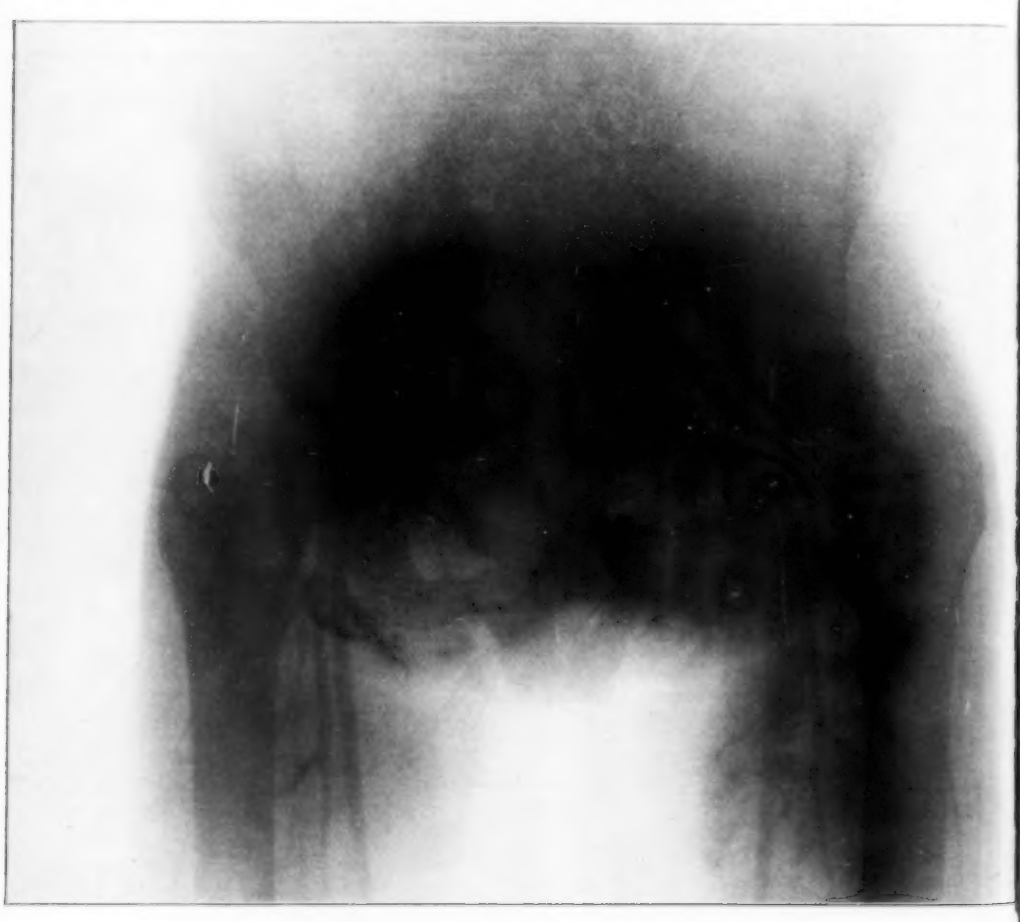
Improvement of Over-exposed Plates.—We know that plates when exposed too long in the camera are weak and uniformly gray when over-exposure is very great, only traces of an image are obtained. It suffices to dip a plate, even when much over-exposed, into a tartar emetic solution (2.5 grs. in 100 grs. of water) for about two minutes, let it dry and develop with hydroquinone, in order to obtain a strong image. Thus plates, otherwise useless, can be saved. It is indifferent whether the plate be treated before or after exposure. Salts of antimony or arsenic with organic oxide possesses the same property. It is the same with morphine and codeine salts; they give softer negatives than tartar emetic, with pyrogallic acid, and with hydroquinone. Amidol, metol, orthol, and pyro, when in very slight quantities (1 centigramme in 100 grs. of water), and previously oxidated by action of air, delay appearance of the entire

has proposed for them the name "para-cathodic rays."

The author has measured the deflection of the "para-cathodic rays" in a given magnetic field, and compared it with the magnetic deflection of the direct cathode rays in the same tube. No difference could be detected in the behavior of the two sets of rays. This fact must be looked upon as an argument in favor of Goldstein's view. According to the generally accepted theory, cathode rays consist of small negatively charged particles repelled at enormous speed from the cathode. It seems probable that when these particles strike an obstacle some are stopped, and by their impact produce the x-rays; a few of the particles may, however, rebound like elastic balls. The particles that rebound will then travel off with practically undiminished velocity and will form the "para-cathodic rays," possessing all the properties of the original cathode rays.



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# LONDON ITEMS.

J. M. BARBOUR, M. B.,
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### The Roentgen Rays in Italy.*

According to a review by Dr. Emile Boix in the current number of Duplay's *Archives*, one of the latest additions to the series of manuals which, to the number of over 600, have been issued by the well-known Milanese publisher Ulrico Hoepli with a view to the popularizing of science, art, and literature, consists of a volume by Italo Tonta on the nature, history, and practical application of the Roentgen rays. The author, who has studied his subject in several German schools, adds the experience of others to his own observations and advances certain hypotheses which he has formed regarding the nature of the rays and the effects which they produce. He also discusses their mode of action, chemical and luminous, and is able to find a great many points of analogy between them and lightning. Adopting Crookes' theory that all transmissible physical forces are due to vibrations through ether and matter differing from each other solely by reason of the relative rapidity of the vibrations, he likewise agrees with Roentgen, that whereas electricity corresponds to 33,359,730,750 oscillations per second the x-rays should be included in the category which corresponds to about 300,000,000,000 oscillations per second. But Signor Italo Tonta does not adhere exclusively to the dry bones of science, being evidently of opinion with Horace that *omne tulit punctum qui miscuit utile dulci*, for he quotes the following definition of electricity which was written by Galileo Ferrari in an album at the request of a young lady with scientific aspirations: "Ever since Maxwell showed that luminous vibrations may consist in periodic variations of the electro-magnetic forces and his theory was given an experimental basis by Hertz, who adduced facts to prove that electro-magnetic oscillations propagate themselves as light does, the idea has gone on growing ever firmer that the luminous ether and the medium where electro-magnetic forces have their seat are one and the same thing. Wherefore, O! maiden, so intelligent and so amiable, who dost ask What is electricity? am I able to reply to thine inquiry. Electricity is not only the titanic agent which tearing athwart the atmosphere terrifies by the crash of its thunderbolt, but also the vivifying agent which transmits from the sun to the earth by means of light and heat the magic color and the breath of life, which communicates to thy heart the pulsing of the external world and conveys to thy soul the enchantment of a look and of a smile."—*Lancet.*, 2, 22, 10, 1898.

*Italo Tonta: Raggi di Roentgen e loro pratiche applicazioni, 160 pp., 65 figs., and 14 plates. Milan: Hoepli, 1898.

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Improvement of Over-exposed Plates.—We know that plates when exposed too long in the camera are weak and uniformly gray when over-exposure is very great, only traces of an image are obtained. It suffices to dip a plate, even when much over-exposed, into a tartar emetic solution (2.5 grs. in 100 grs. of water) for about two minutes, let it dry and develop with hydroquinone, in order to obtain a strong image. Thus plates, otherwise useless, can be saved. It is indifferent whether the plate be treated before or after exposure. Salts of antimony or arsenic with organic oxide possesses the same property. It is the same with morphine and codeine salts; they give softer negatives than tartar emetic, with pyrogallic acid, and with hydroquinone. Amidol, metol, orthol, and pyro, when in very slight quantities (1 centigramme in 100 grs. of water), and previously oxidated by action of air, delay appearance of the entire

image in case of under-exposure, and favor the appearance of the large blacks in case of over-exposure. They enable the obtaining of good negatives with strong contrasts when exposure has been excessively prolonged. Employed after exposure they delay appearance of the image and give it less intensity. These same non-oxidated developer-reducers, (particularly armidol) promote development when used with hydroquinone or pyrogallic acid. They increase the intensity of the blacks, and preserve great purity in the image. The various substances of which I have spoken act only when allowed to dry on the plate. It is useless to add them to the developer.—M. MERCIER (*comptes rendus*).—*The Photogram*, London.

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X-RAY PRINTING is announced by Monsieur Georges Isambard, who describes himself as a "literary man," as a new money-saving printing process. He proposes to sensitize sheets of paper, to lay them over each other in thick pads, and to print by exposing to the x-rays, with a stencil-plate or type-screen "printed in ray proof ink." He proposes to have one set screen at the top and another at the bottom of the pile, in order that he may print both sides of the paper at once, and in order to prevent the rays from one side interfering with those from the other, he arranges his lines of type and his spaces to be of equal width, and so disposed that the line of type on one side of the page falls opposite the blank line on the other side. On his type screen he represents his lines by strips of lead which prevents the rays from passing through them. This is an exceedingly ingenious development of a suggestion which was made in quite the early days of radiography, but it suggests such obvious practical difficulties as to render it more like an interesting dream than a suggestion ever likely to be realized.—*The Photogram*, London.

**Photographic Effects Produced by Bacteria.**

The "rapid" dry photographic plate with its extremely sensitive film has become a most remarkable aid to knowledge. It has brought countless stars to view which had otherwise escaped observation even with powerful instruments and it has more recently demonstrated the existence of dark light, so to speak—i. e., of radiations which are not realized by the eye, having no apparent effect upon the optic nerve. Recent experiments have shown that almost all substances give off a dark radiation or, at any rate, something which affects the sensitive silver film. This has been attributed to the throwing off of vapor in minute quantity, but sufficiently to act upon the photographic plate in the same way as actinic rays. Dr. Percy Frankland has now shown that certain bacteria have the property of producing images. With some organisms the effect is obtained when the sensitized plate is placed at a distance of half an inch over the culture, whilst when in contact with the film definite pictures of the bacterial growths result. Since the interposition of a piece of glass prevents the action it is probable that the action is due to the evolution of volatile chemical substances. But with phosphorescent bacteria the phenomenon is evidently a different one, since the interposition of glass makes no difference, the organisms emitting a radiation which traverses the glass easily. It is suggested that it is quite possible that considerable differences as regards activity toward a photographic plate may be found to exist with different bacteria, in which case this property may become of importance in their diagnosis. If the method could be applied to the identification of typhoid fever and cholera bacilli in water its value in the service of public health would indeed be great.—*Lancet*, October. 22, 1898.

## The Harbeian Oration on the Influence of Character and Right Judgment In Medicine.

BY SIR DYCE DUCKWORTH, M. D.,
Delivered before the Royal College of Physicians of London, on October 18th, 1898.

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In a lengthy oration Dr. Duckworth touched upon Roentgen work as follows:

Amongst the secrets wrested from nature in recent times is the discovery of the Roentgen rays, which have already proved of great practical use to surgeons for the detection in certain parts of foreign bodies and the exact determination of injuries to the skeleton. To the physician these scrutinizing rays have as yet yielded little new information. Some varieties of renal calculi may sometimes be detected by them, but they afford no evidence of billiary concretions. We may, however, obtain indications of solid tumors and aneurysms, and enlargement of certain viscera. The therapeutic influence of these rays, if any exists, is as yet not determined. According to Rieder, of Munich, rays emitted from "hard," *i. e.*, high vacuum, tubes kill bacteria. Such rays have the highest penetrating power. With the assistance of my colleague, Dr. Lewis Jones, I have examined radioscopically the lungs of several patients with tuberculous disease in various stages. The physical signs were well marked and readily detectable by the ordinary methods of examination. The consolidated portions of the lungs gave no further evidence of their condition than a somewhat dark opacity, in mottled tracts, as compared with the luminous clearness of the unaffected parts. Pleural effusions and pneumothorax are detectable, also pneumodic consolidations, and even early and limited areas of tuberculous deposit. In a recent report on this subject MM. Bouchard and Claude, of Paris[27] declare that cavities can readily be discovered and even enlargements of bronchial lymph-glands.[28] The free movements of the diaphragm are well displayed and are well worthy of study, since it is found that this structure is lowered on the affected side in cses of consolidation of the apex of the lung and rendered dense and immovable in diaphragmatic pleurisy. The most startling revelation by means of the x-rays is that of M. Kelsch, who declares that he discovered the existence of pulmonary tuberculosis in 51 out of 124 military patients who presented none of the ordinary signs of the malady. With respect to these observations I will only say that I desire more detailed evidence and, with it, confirmation.

It may be affirmed that radioscopy and skiagraphs tell but little to the physician that could not be ascertained by other methods of physical examination, but they certainly afford additional means for accurate clinical determination. Thus, in a case of mitral valvular disease with great cardiac hypertrophy which I examined the melon-shaped outline of the heart could be seen to bulk more largely in the thorax than the physical signs alone led one to believe. With improved apparatus we may come to better results than any yet attained, and, indeed, there may be other secrets in the domain of electrical science awaiting diligent research, of which perchance some may serve to revolutionize our present methods of clinical investigation.—*Lancet.*

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SPECULATIONS CONCERNING ROENTGEN RAYS. Woodward. *Elec. Eng.*, Oct. 13. *Electrical World*, N. Y.—A short article on the nature of these rays. Believing them to be vibrations of an inconceivably short period, he suggests that the rays may be very closely related to the solar spectrum, whose period of vibration is very short. He suggests that we might call electricity an "effect produced by a vibration capable of a

minimum and maximum period, and, according to the length of the vibration period, are produced sound, heat, light, Roentgen rays, and electricity, in the sense we have understood it."—*Electrical World, N. Y.*

DEFLECTION OF CATHODE RAYS. Kaufmann. *Wied. Ann.* No. 6; abstracted briefly in the Lond. *Elec.*, July 15.—He superposes a magnetic upon an electrostatic deflection and from the resulting deflection he draws important conclusions. The deflection is inversely proportional to the square root of the difference of potential between the anode and the cathode. If along any given length of path a certain potential is maintained, the anode ceases to exert any influence and the deflection is inversely proportional to the square root of the difference of potential between the length in question and the cathode. The deflection obeys the law indicated by the emission theory.

ROENTGEN RAYS IN MEDICAL WORK.—A complete Roentgen ray equipment has been presented to the North-Eastern Hospital for Children, Hackney Road, Shoreditch, England, by the Duke of Newcastle. The apparatus throws an 18-inch spark, and is one of the largest and most efficient in existence.

THE attractive, unique and expressive Calendar of the Antikamnia Chemical Co., is out for 1899. Six lively pictures are shown of the bones of the face without the aid of the x-rays—the old, old way.

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LONDON: SMITH, ELDERS & CO.,
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## THE TREATMENT OF DISEASE BY ELECTRIC CURRENTS.

A handbook of plain instructions for the general practitioner. By S. H. Monell, M. D., Brooklyn, N. Y. Published by William Beverly Harison, 3 and 5 West 18th Street, New York. 1088 pages.

Another extremely valuable work on electro-therapeutics has been launched by the same author as the recent publication, "Manual of Static Electricity in X-Ray and Therapeutic Uses," which has attracted world-wide reputation thus early for its clearness of description, and usefulness to the general practitioner.

It would be impossible for us to specialize the headings of the 70 chapters in this volume in the space allotted for this review, therefore it must suffice to state that every known modern employment for faradic, galvanic and static electricity and their therapeutic indications are detailed in this volume with conciseness of language and minute directness of application, so that the general practitioner may read and understand.

Probably no book on electro-therapeutics, and we say it conservatively, has ever equaled this volume for value to those of the profession who would use electricity as a therapeutic agent, and he who does not use it at this age is certainly not up to the times in his profession.

We therefore heartily recommend this volume to our readers, believing that they will not be disappointed in adding it to their libraries.—*Medical Times and Register*, Phila., Pa., January, 1898.

Manual of Static Electricity in X-Ray and Therapeutic Uses, . . . . . $6.00
Treatment of Disease by Electric Currents . . 7.50

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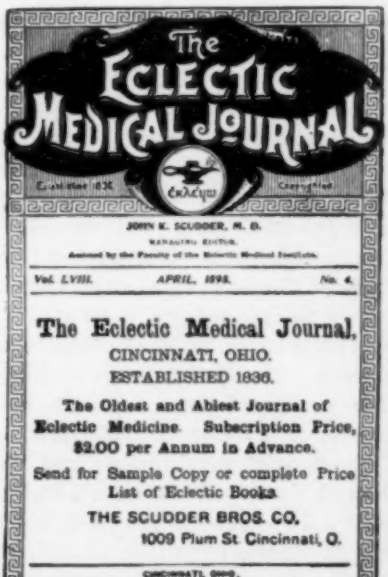
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